

REMARKS

As an initial matter, the Applicant's undersigned attorney is grateful for the Examiner's courtesy during a February 8 phone conference held to discuss the current rejections and potential areas of allowability. Although no agreement was reached, the Examiner's comments were useful in framing the above amendments, below remarks, and in otherwise guiding Applicant's continued prosecution of the application. For example, claim 17 has been amended to further clarify that it is directed to a passive fuel cell as was recommended by the Examiner.

The Advisory Action mailed on January 9, 2007 maintains the rejections of claims 17, 21, 51-57 as obvious over U.S. Patent No. 5,904,740 to Davis ("Davis") in view of U.S. Patent Publication No. 2003/0170508 to Beckmann et al. ("Beckmann"), and the rejection of claims 18 and 19 as obvious over Davis in view of Beckmann and further in view of J. Power Source 112 (2002) 655-659 by Ha, Masel, and others ("the Ha reference"). The Advisory Action also maintains rejections of claim 22 as obvious over Davis in view of Beckmann and further in view of U.S. Patent No. 6,924,055 to Hirsch et al. ("Hirsch") and of claim 23 as obvious over Davis in view of Beckmann and further in view of U.S. Patent No. 5,898,113 to Vecere ("Vecere"). These rejections are traversed for the reasons set forth below.

A. RESTRICTION

The Advisory Action also maintains the restriction of claims 58-63. These claims have been cancelled herein.

B. CLAIM 17 AND ITS DEPENDENT CLAIMS ARE NOT OBVIOUS

Attention is now turned to the rejection of the claims, beginning with claim 17. Claim 17 is not obvious for at least the reasons discussed below. Since claim 17 is not obvious, claims 18-19, 21-23, and 51-57, all of which depend from claim 17, are likewise not obvious for at least the same reasons.

1. BECKMANN AND DAVIS DISCLOSE ACTIVE CELLS THAT, CONTRARY TO THEIR TEACHINGS, MUST BE RENDERED INOPERABLE TO SUPPORT THE REJECTION OF CLAIM 17

Claim 17 has been amended to further clarify that it is directed to a passive fuel cell. In particular, amended claim 17 recites that the anode enclosure be configured to substantially prevent passage of the fuel solution therefrom during operation of the fuel cell wherey the fuel cell operates as a passive fuel cell. Support for this can be found at, among other locations, page 8, lines 29-30; page 17, lines 29-31; and page 21, lines 15-20. It is submitted that neither Davis nor Beckmann disclose or suggest this limitation, and that in fact their disclosures of active cells teach away from this.

Beckmann teaches that its anode enclosure necessarily be exposed to an external pump 11 to operate its active cell. Paragraph 34. Likewise, Davis teaches that fuel solution is actively circulated into and out of chamber 22 during operation. Fig. 1; col. 4, lines 36-46. Both references therefore fail to disclose an anode enclosure that is configured to prevent passage of the fuel solution during operation. Instead, the active cells of Beckmann and Davis require open inlets and outlets during cell operation to continuously circulate fuel solution under influence of a pump (see Davis' anode enclosure ports 20 and 31 and Beckmann's anode enclosure ports 69 and 71).

Davis and Beckmann's teaching of anode enclosures open to an external circulation pump, in fact, illustrates one of the problems that the claimed invention is directed to overcoming. This is pointed out in the specification: "The efficiency of passive cells can be limited, however, by the circulation of fuel to the anode. ... Circulation pumps have been proposed to circulate liquid fuel in a passive cell. Such pumps, however, render moot some of the advantages of the passive cell." Page 3, lines 15-19.

It is further noted that the Final Office Action argued that the active fuel cells of Davis or Beckmann could be "characterized as passive when the circulation of fuel reactants is interrupted or terminated." This is pure supposition of the Examiner, and not based on any teaching found in Davis or Beckmann. With regard to Beckmann, the

Examiner presumably assumes that its external pump 11 is broken to “interrupt or terminate” the active cell’s fuel supply. However, when the circulation of fuel is “interrupted or terminated” as the Office Action suggests is necessary in its modification of Beckmann and Davis, their devices are inoperable.

Making an active fuel cell inoperable does not convert it to a passive fuel cell. The art and ordinary artisans recognize two types of fuel cells - active fuel cells that require continuous feed of fuel solution using pumps or the like (such as Beckmann’s and Davis’) and passive cells that do not. Citing references that teach active fuel cells and arguing that their fuel supplies are “interrupted or terminated” to suggest they disclose passive cells is improper.

2. BECKMANN FAILS TO SUGGEST THE LIMITATIONS OF CLAIM 17

Claim 17 recites a gas remover comprising a plurality of passages that are configured to allow passage of CO₂ and that are positioned to promote circulation of the organic fuel solution as gas travels therethrough. As explained in detail in Amendment A, Beckmann discloses only a single opening 72 for removing CO₂, and fails to disclose or suggest that this opening be positioned to promote circulation of fuel solution. As discussed in the specification, the claimed plurality of passages has been discovered to offer benefits and advantages over the prior art in that they cause gas to flow through the fuel solution in a manner sufficient to provide useful circulation of the solution. Page 16, lines 15-19. This represents a new and unexpected result that is not disclosed or suggested by Beckmann.

Additional evidence of non-obviousness over Beckmann includes the improvements and benefits the claimed structure achieves over Beckmann’s disclosure. As explained in the specification, the claimed gas remover structure at least partially contributes to the ability of the claimed cell to operate with high efficiency as a passive cell that does not require an external pump or other device for circulating fuel solution. Specification, page 17, lines 29-31. Beckmann’s active cell, on the other hand, relies on an external pump 11 for feeding fuel solution. Paragraph 34. Accordingly, the claimed

structure at least partially contributes to benefits and advantages that are achieved over Beckmann's disclosure.

Claim 17 is therefore not obvious, and the rejection over Davis in view of Beckmann should be withdrawn.

C. THE HA REFERENCE IS NOT PRIOR ART TO CLAIMS 18 AND 19

Claims 18 and 19 depend from claim 17 and are allowable for the same reasons as are that claim. These claims are allowable for other reasons as well. Claim 18 recites a fuel solution having a formic acid concentration of at least about 4.4 molar, and claim 19 of at least about 8.8 molar. Claims 18 and 19 stand rejected as obvious over Davis and Beckmann in view of the Ha reference. The Final Office Action admits that Davis does not disclose a fuel solution near this concentration and relies on the Ha reference as disclosing this concentration.

During the February 8 phone conference, the Examiner explained that the Ha reference was cited as a 35 U.S.C. §102(a) reference to reject claims 18 and 19 (although the Ha reference is combined with other references to reject claims as obvious), and that a declaration would be required to remove the reference from consideration. Accordingly, an attribution declaration under 37 C.F.R. §1.132 is provided herewith. This attribution declaration is effective to remove this §102(a) reference. MPEP §716.10, Example 2. Further, this reference cannot be a §102(b) reference since it was published in November 2002, less than one year before the filing of the present application on September 17, 2003. As a result, claims 18 and 19 are allowable.

D. CLAIMS 52 AND 53 ARE ALLOWABLE

Claims 52 and 53 depend from claim 17 and are allowable for the same reasons as are that claim. Claims 52 and 53 are allowable for other reasons as well. For example, claim 52 recites that each of the plurality of passages have an entrance extending inward into the anode enclosure that is separated from the at least one anode enclosure wall. Claim 53 depends from claim 52 and further recites that the entrance be

separated from the wall by at least about 0.01 inch. This claimed structure provides a new and unexpected result: "...it has been discovered that providing a passage entrance 44 that is separated by a distance from the wall 46 of the anode enclosure 30 is also useful to promote useful circulation of the fuel solution." page 17, lines 19-21.

Claim 52 stands rejected as obvious over Davis in view of Beckmann. Not only does Beckmann fail to disclose the recited plurality of passages positioned to promote circulation, but it further fails to disclose a passage entrance that is separated inwardly from the wall by some distance. It is noted that neither the Final Office Action or the Advisory Action provides any discussion of its rejection of claim 52. With regard to claim 53 the Final Office Action suggests that the claimed structure represents a mere variation in dimensions or location over Beckmann. This is an oversimplification.

The Final Office Action alleged in its rejection of claim 17 that a plurality of passages would be obvious over Beckmann. Putting aside the applicant's disagreement with that rejection for the moment, it is submitted that further extending this argument to reject claims 52-53 cannot stand. To do so, it must be accepted that one considering Beckmann's single opening 72 will be led not only to duplicate this passage into the claimed plurality of passages (and to position those passages to promote circulation), but further that one would be led to the recitation of claim 52 of an entrance to each of the passages that is separated inwardly from a wall and the recitation of claim 53 that the separation distance is at least about 0.01". It is submitted that Beckmann's limited disclosure cannot be stretched this far, and that the obviousness rejection of claims 52 and 53 cannot stand.

It is also submitted that Beckmann teaches away from claims 52 and 53 since its opening 72 is disclosed as having an entrance that is flush with the enclosure 66 interior wall. It is further submitted that if the limitations of claims 52 and 53 were truly obvious, some reference could be cited disclosing their limitations. It is noteworthy that no reference has been cited disclosing even a single gas removal passage (much less the recited plurality) having an entrance separated from an enclosure wall to extend inward into the enclosure.

E. CLAIM 57 IS ALLOWABLE

Claim 57 depends from claim 17 and is allowable for the same reasons as are that claim. Claim 57 is also allowable on other bases as well. For example, claim 57 recites that the anode enclosure be defined by a plurality of walls and that at least a first of the plurality of gas remover passages be in a first wall and a second be in a second wall. Claim 57 stands rejected as obvious over Davis in view of Beckmann.

As discussed above, although Beckmann fails to disclose the recited plurality of passages, the Office Action alleges that this would be obvious when considering Beckmann. Putting aside the applicant's disagreement with that argument, it is submitted that the further extension of Beckman's limited teachings to support an obviousness rejection of claim 57 is improper. As with claims 52-53 above, the inventive leap required from Beckmann's single opening 72 to the claimed structure is simply too substantial to be reached through an obviousness rejection.

When rejecting claim 57 as obvious over Beckmann, the Final Office Action suggests that it would have been an obvious matter of design choice to alter the passages of Beckmann into specific dimensions, length to diameter ratios and locations. This rejection, however, overlooks Beckmann's failure to disclose the recited plurality of passages. For the rejection to be proper requires one considering Beckmann to not only be led to duplicating its single opening 72, but further to be led to locating at least one of the duplicated openings on a different enclosure wall than the opening 72. It is submitted that this represents an improper stretching of Beckmann.

As with the rejection of claims 52-53 noted above, it is also submitted that if these recited features were truly obvious, some reference would have been cited disclosing them. It is noteworthy that no reference has been cited disclosing a plurality of gas removal passages with at least one being located on a different enclosure wall than a second. For the above reasons, it is submitted that the obviousness rejection of claim 57 must be withdrawn.

F. NEW CLAIMS 64 - 69 ARE ALLOWABLE

New claims 64 – 69 have been presented for consideration and are believed to be allowable. New claim 64 depends from claim 17 and further recites that the anode enclosure include a sealing means operable to prevent the fuel solution from exiting the anode enclosure. New claim 65 depends from claim 64 and recites that the sealing means be a valve. New claim 66 depends from claim 17 and recites that the anode enclosure be sealed during operation of the cell whereby the fuel solution is not exposed to any external pumping during cell operation. As explained above, neither of Beckmann nor Davis's active cells disclose or suggest these limitations, but instead require fuel pumped through the anode enclosure during operation.

New claim 67 depends from claim 17 and further recites that that the anode enclosure include one and only one passage for communicating fuel solution into and out of the anode enclosure. Neither Beckmann nor Davis disclose this, but instead require open "in" and "out" ports to circulate fuel to their active cells during operation (see Davis' anode enclosure ports 20 and 31 and Beckmann's anode enclosure ports 69 and 71).

New claims 68 and 69 represent former claims 18 and 19 (respectively) rewritten in independent form. As explained above, the enclosed Attribution Declaration is effective to remove the Ha reference, with the result that claims 68 and 69 are allowable.

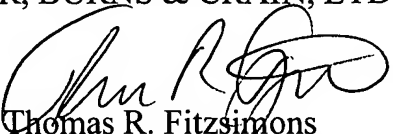
G. CONCLUSION

In conclusion, it is submitted that all claims in their current form are allowable. Should the Examiner feel that there are any issues that may be resolved over the phone or issues that should be explored prior to an appeal, Applicant's undersigned attorney requests the favor of a phone conference to discuss the same.

Respectfully submitted,

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